INTEX-NA Flight 5: July 8, 2004

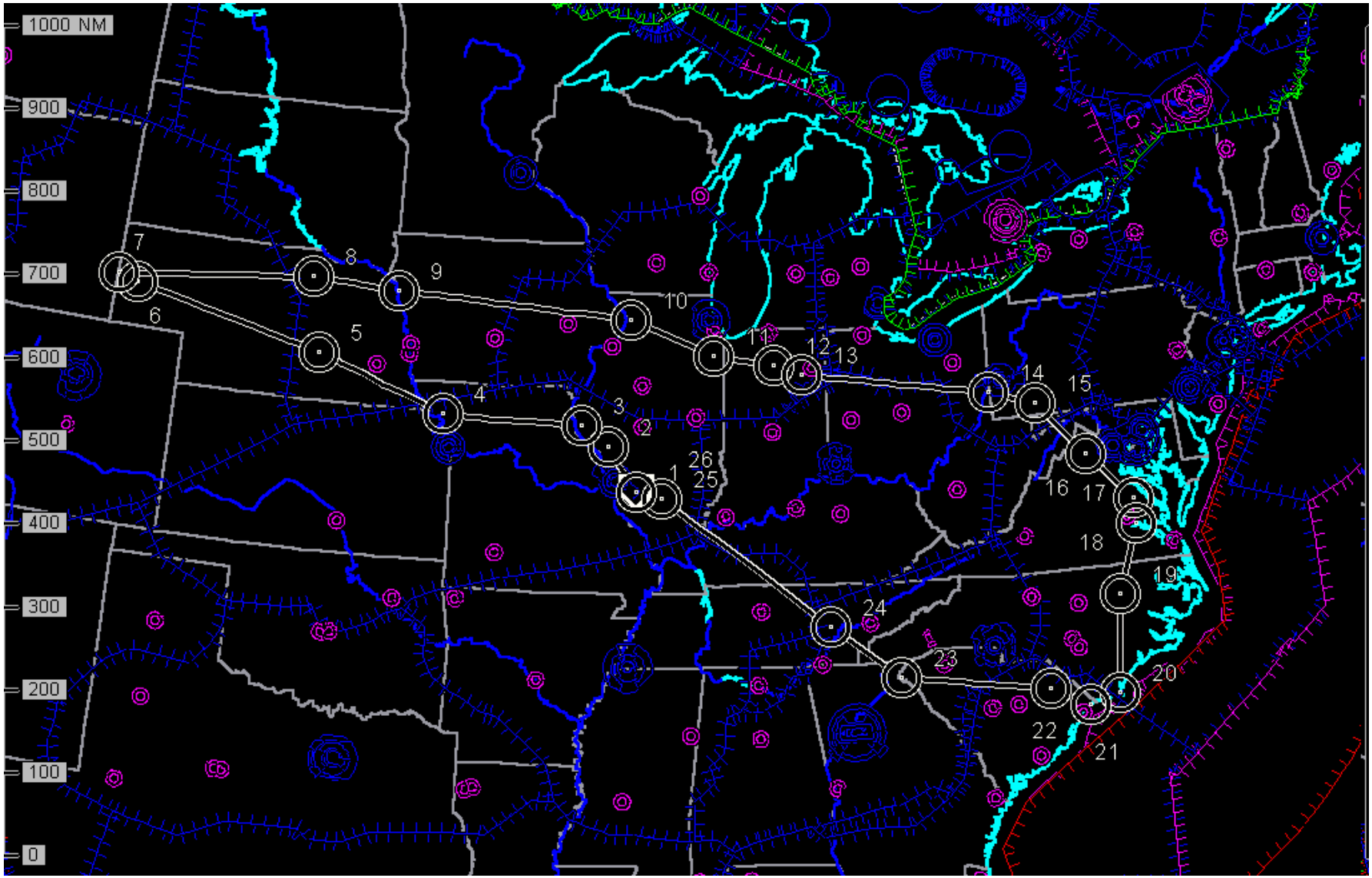
This was the first INTEX science flight from MidAmerica and was focused on the validation of the MOPITT and MODIS instruments aboard the Terra satellite, characterization of aged California outflow, mapping of mid-western boundary layer pollution, sampling of deep convection over the Carolinas, and exploring the relationship between biogenic emissions and their products over the smoky Mountains. The flight was guided by forecasts from multiple models supporting INTEX along with meteorological analysis and just in time GOES imagery. The UV Dial Lidar aboard the DC-8 could not be operated on this flight due to unforeseen FAA requirements. We hope that this difficulty will be overcome before the next flight. Total flight duration was 8.7 hours with a nominal 8:30 am takeoff. Basic flight patterns and there location are shown in the slides below although these were greatly modified during the flight.

Two low pressure areas dominated the surface flow. The low located just north of New York had a cold front extending southward along the Atlantic Coast. This front then became warm over Tennessee and southern Missouri, ending at the second low over Kansas. There was no well defined high pressure north of this frontal system. However, the Bermuda High was firmly established along the Gulf Coast States. This combination of systems produced southerly flow over the Gulf States; while flow north of the front was mostly from the west. There continued to be abundant deep convection along the Gulf Coast and in advance of the warm front over the Midwest. The flow in the middle levels was dominated by a closed low near Lake Huron and its associated trough that extended south along the Appalachian Mountains.

We flew in the north westerly direction and sampled boundary layer pollution that appeared to originate from the gulf states. Typical concentrations in the lowest troposphere were HCHO>3 ppb; HNO3>1 ppb, NO2> 400 ppt. Subsequently we intercepted aged California pollution that had been lofted to the middle troposphere (below 6 km) over Nebraska. The sampling profile was altered some to reach the Terra rendezvous point at 1700 UT at 42N and 90 west. We spiraled down from 37000 to 1000 ft near the nadir point of the MOPITT instrument,in a moderately small cloud free region that extended through the depth of the troposphere. Strong CO2 drawdown was evident at the surface level. Further east we encountered extensive pollution behind a weak cold front in a high pressure area. This air contained large concentrations of virtually all primary and secondary pollutants but only moderate concentrations of O3 (60-70 ppb). We expect this stagnating high pressure pollution system to further develop over the next several days. Over the Carolinas we saw strong evidence of deep convection with large plumes in a thick layer that extended from 23000 to 33000 ft. These aged plumes contained large amounts of primary (carbonaceous) particles and secondary pollutants but very little soluble materials such as H2O2. Frequently very high concentrations of HCHO (300-500 ppt) were encountered in the upper troposphere. On the return journey we hugged the Smokey Mountain terrain to sample air that is expected to be greatly influenced by biogenic emissions. Overall, this was a highly successful flight that accomplished all of the planned science objectives and encountered interesting new phenomenon.

The navigational data are available at URL: http://www.dfrc.nasa.gov/Research/AirSci/DC-8/ICATS/index.html

INTEX July 8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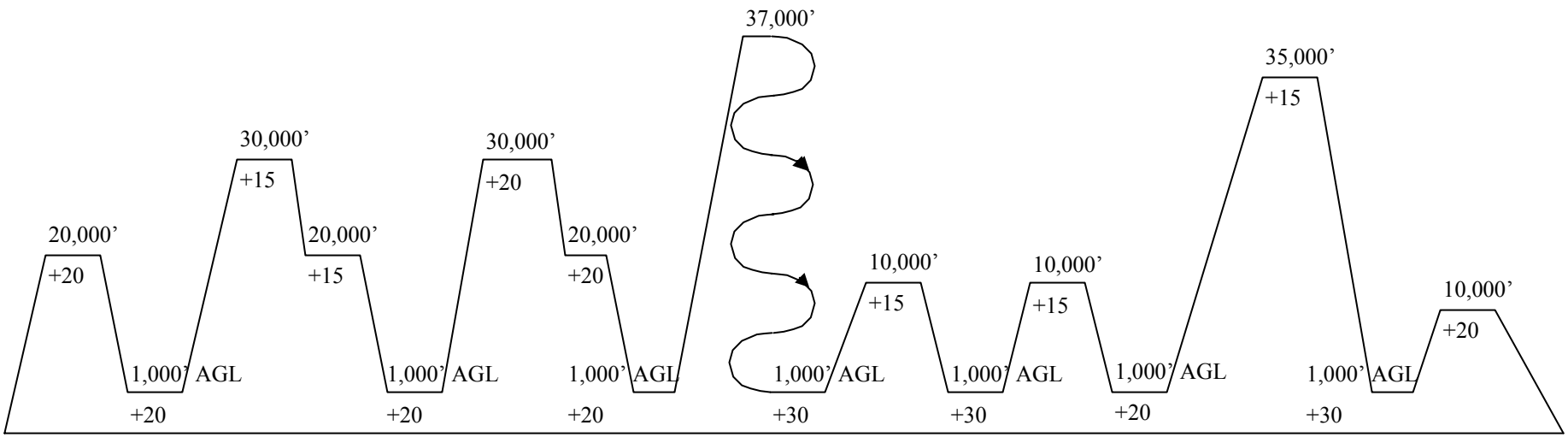
INTEX July 8

ALL CLIMBS/DESCENTS

1500 FPM

SPIRAL DESCENT

1500 FPM



BLV PT7 PT10 PT16 PT20 BLV

July 8, 2004

TYPE ACFT	CALL SIGN	DATE	FROM	TO	PLND TO	ACT TO	PILOT	COPILOT
DC-8	NASA817		SCOTT AFB MID N 38 32.7 W089 50.1	SCOTT AFB MID N 38 32.7 W089 50.1	13:30			

TOT DIST	TOT TIME	FUEL REQ		
2911.3	08+42	88945	NAVIGATOR	ENGINEER

TP DTD#	Fix/Point Description	FREQ	Latitude Longitude	Alt Wind	TAS GS	TC MC	LEG DIST DIST REM	LEG TIME TIME REM	ETA	RETA	ATA	REMARKS
1	KBLV/A SCOTT AFB MID		N 38 32.7 W089 50.1	459M		136 137	5.0 2906	00+02 08+40	13:30			
2	LEBOY/W LEBOY		N 39 26.0 W090 34.4	15000M	360 360	326 326	68.4 2838	00+12 08+28	13:44			
3	UIN/R QUINCY	083X 113.60	N 39 50.9 W091 16.7	15000M	360 360	307 307	41.1 2797	00+07 08+21	13:51			
4	STJ/R ST. JOSEPH	102X 115.50	N 39 57.6 W094 55.5	15000M	360 360	272 270	168.5 2628	00+28 07+53	14:19			
5	GRI/R GRAND ISLAND	057X 112.00	N 40 59.0 W098 18.9	15000M	360 360	292 287	166.9 2461	00+28 07+25	14:47			
6	BFF/R SCOTTSBLUFF	073X 112.60	N 41 53.6 W103 28.9	15000M	360 360	283 276	239.4 2222	00+40 06+45	15:27			
7	.PT 07 BFF/R273024	073X 112.60	N 42 00.0 W104 00.0	15000M	360 360	285 276	24.0 2198	00+04 06+41	15:31			
8	ONL/R O'NEILL	086X 113.90	N 42 28.2 W098 41.2	15000M	360 360	083 075	238.4 1960	00+40 06+01	16:11			
9	SUX/R SIOUX CITY	112X 116.50	N 42 20.7 W096 19.4	15000M	360 360	094 089	105.3 1854	00+18 05+44	16:28			
10	.PT 10 CVA/R047028	085X 113.80	N 42 00.0 W090 00.0	15000M	360 360	094 092	282.8 1571	00+47 04+56	17:15			
	.delay	085X 113.80	N 42 00.0 W090 00.0	15000M	360 360	094 095	0.0 1571	00+30 04+26	17:45			
11	EON/R PEOTONE	079X 113.20	N 41 16.2 W087 47.5	15000M	360 360	114 116	108.6 1463	00+18 04+08	18:03			
12	RCR/N ROCHESTER	216.00	N 41 03.9 W086 11.4	15000M	360 360	100 103	73.6 1389	00+12 03+56	18:16			
13	HHG/N HUNTINGTON	417.00	N 40 51.3 W085 27.9	15000M	360 360	111 115	35.3 1354	00+06 03+50	18:22			

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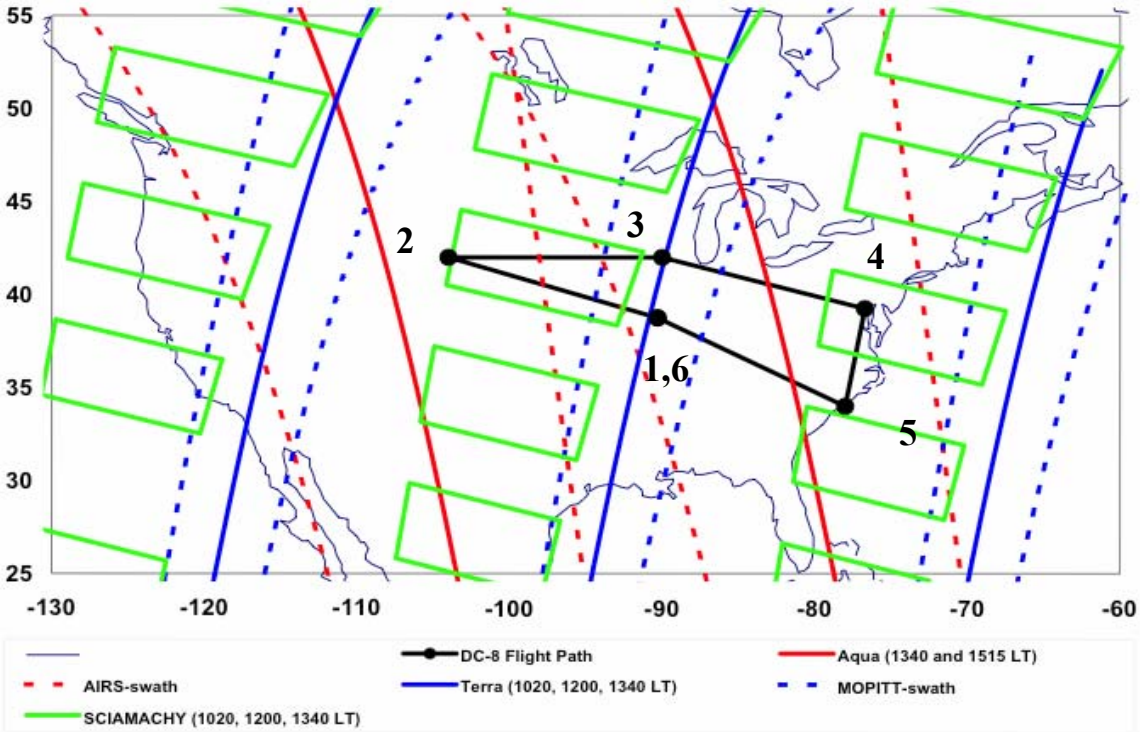
TP DTD#	Fix/Point Description	FREQ	Latitude Longitude	Alt Wind	TAS GS	TC MC	LEG DIST DIST REM	LEG TIME TIME REM	ETA	RETA	ATA	REMARKS
14	HLG/E WHEELING	059X 112.20	N 40 15.6 W080 34.1	15000M	360 360	099 106	226.7 1127	00+38 03+12	18:59			
15	IHD/R INDIAN HEAD	019X 108.20	N 39 58.5 W079 21.5	15000M	360 360	107 116	58.3 1069	00+10 03+03	19:09			
16	LDN/R LINDEN	090X 114.30	N 38 51.3 W078 12.3	15000M	360 360	141 151	85.9 983	00+14 02+48	19:23			
17	.PT 17 HPW/R009030	057X 112.00	N 37 50.0 W077 05.0	15000M	360 360	139 149	80.9 902	00+13 02+35	19:37			
18	HPW/R HOPEWELL	057X 112.00	N 37 19.7 W077 07.0	15000M	360 360	183 193	30.3 872	00+05 02+30	19:42			
19	TYI/R TAR RIVER	125X 117.80	N 35 58.6 W077 42.2	15000M	360 360	199 209	85.8 786	00+14 02+16	19:56			
20	.PT 20 ILM/R203022	117X 117.00	N 34 00.0 W078 00.0	15000M	360 360	187 196	119.3 667	00+20 01+56	20:16			
21	CRE/R GRAND STRAND	123X 117.60	N 33 48.8 W078 43.5	15000M	360 360	253 261	37.9 629	00+06 01+49	20:22			
22	FLO/R FLORENCE	099X 115.20	N 34 14.0 W079 39.4	15000M	360 360	298 306	52.8 576	00+09 01+41	20:31			
23	ODF/R FOOTHILLS	081X 113.40	N 34 41.8 W083 17.9	15000M	360 360	279 285	182.7 393	00+30 01+10	21:02			
24	HCH/R HINCH MOUNTAI	123X 117.60	N 35 46.9 W084 58.7	15000M	360 360	308 313	105.1 288	00+18 +53	21:19			
25	ENL/R CENTRALIA	097X 115.00	N 38 25.2 W089 09.5	15000M	360 360	308 311	255.4 33	00+43 +10	22:02			
26	KBLV/A SCOTT AFB MID		N 38 32.7 W089 50.1	459M		283 284	32.7 0	00+10 +00	22:12			

INTEX flight 5 plan- July 8, 2004



1. Sample aged California outflow at 42N, 105W
2. Terra validation spiral at 42N, 90W and UMBC overpass 39N,75W
3. Map midwest, mid-Atlantic BL in developing regional episode
4. Sample aged pollution + lightning outflow N of Carolinas

Lyatt-GEOS-Chem forecast